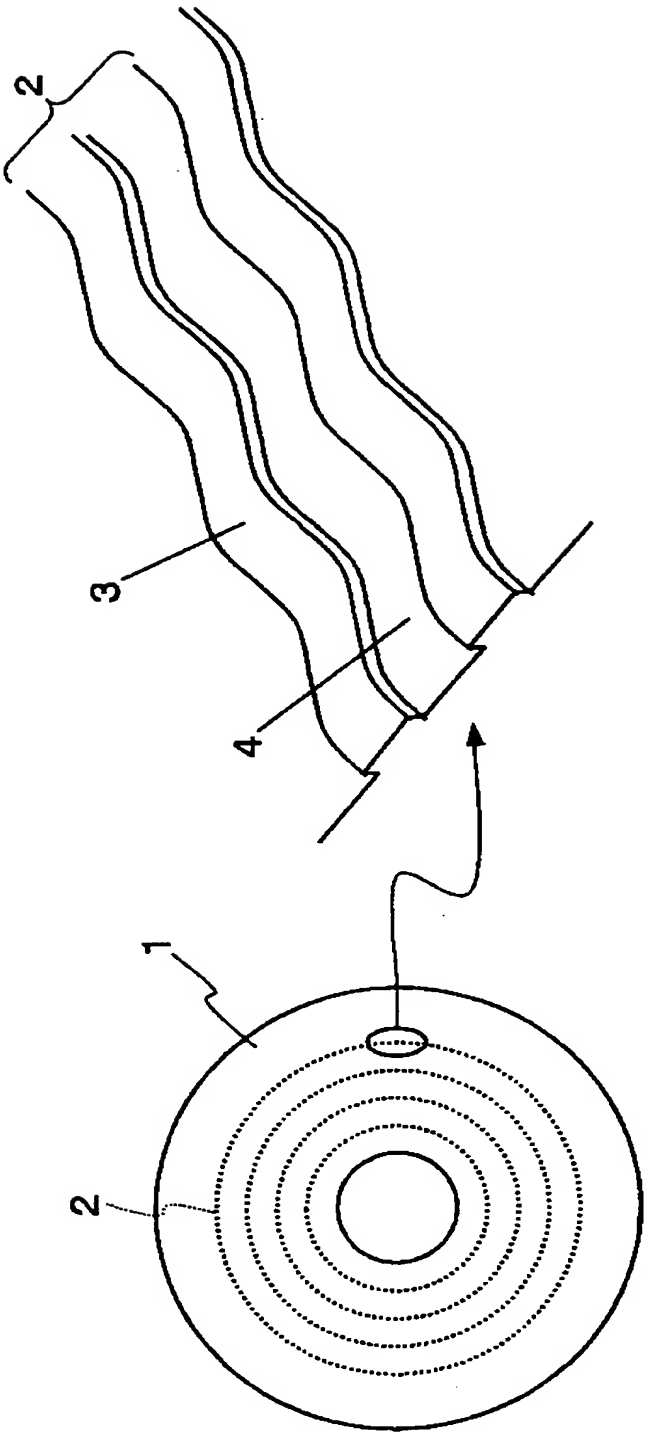


FIG.1B

FIG.1A

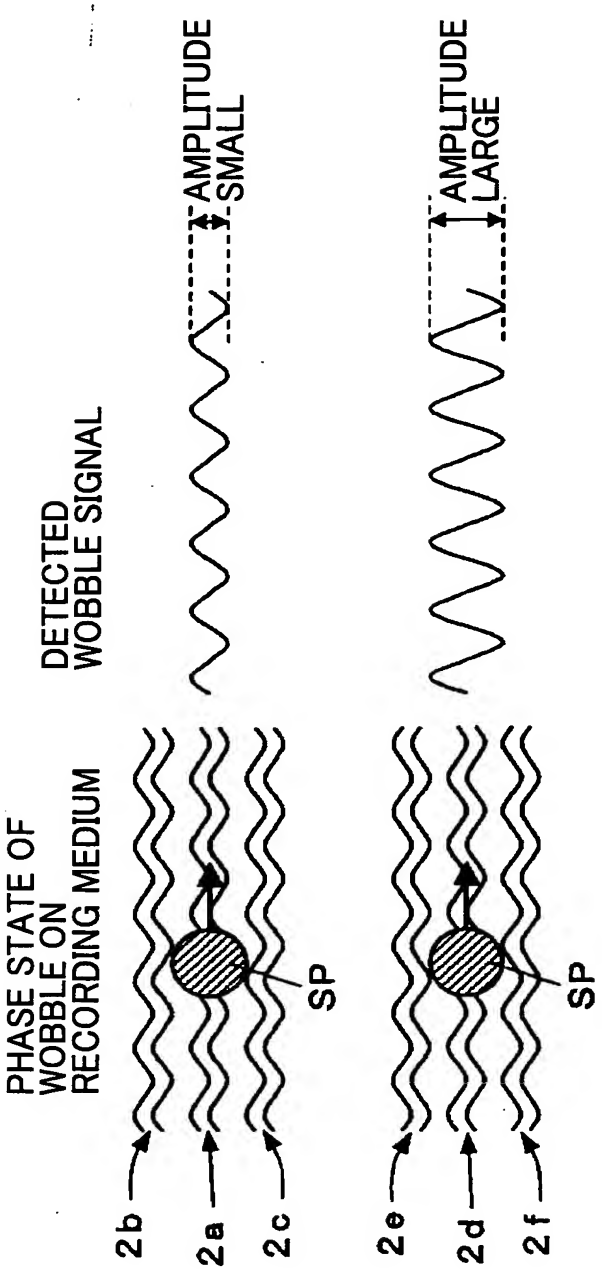

PHASE STATE OF WOBBLE ON RECORDING MEDIUM
DETECTED WOBBLE SIGNAL
AMPLITUDE SMALL
AMPLITUDE LARGE
2b
2a
2c
2e
2d
2f
SP
SP
CASE WHERE ADJACENT WOBBLES ARE THE SAME PHASE
CASE WHERE ADJACENT WOBBLES ARE REVERSED PHASE

FIG.2A

FIG.2B

FIG.3

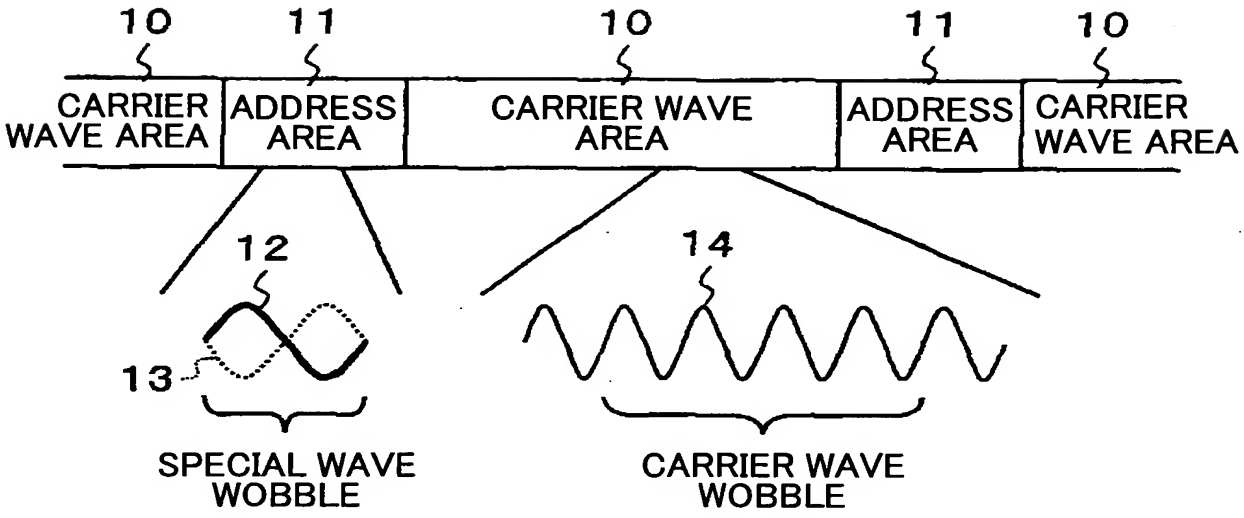
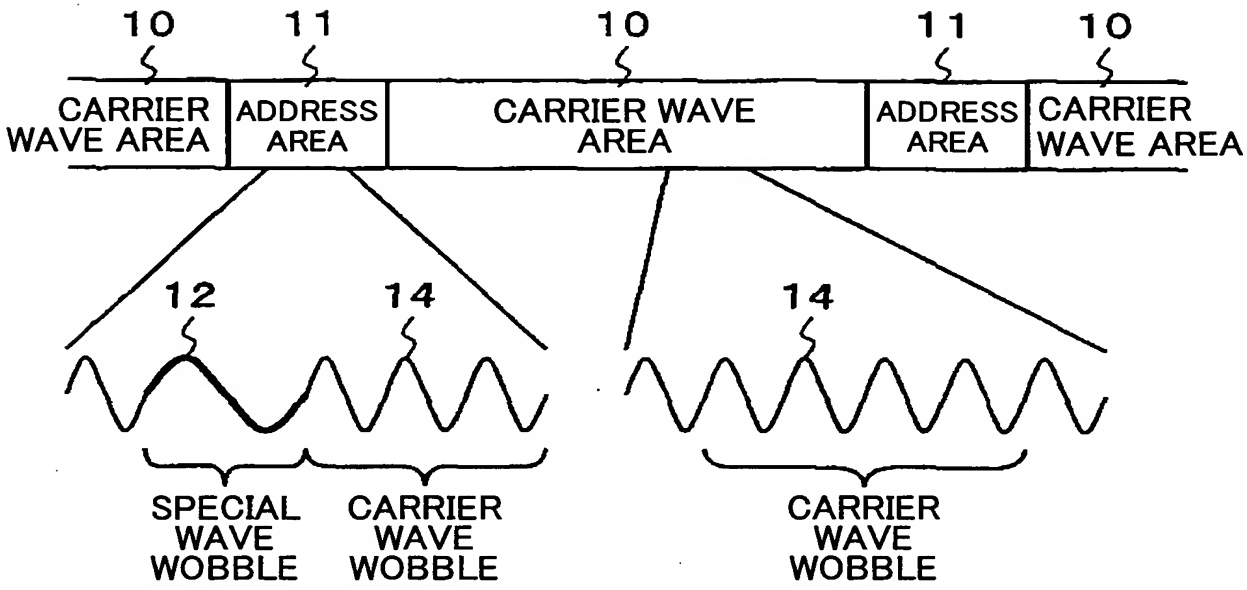

10
11
10
11
10
CARRIER WAVE AREA
ADDRESS AREA
CARRIER WAVE AREA
ADDRESS AREA
CARRIER WAVE AREA
12
13
14
SPECIAL WAVE WOBBLE
CARRIER WAVE WOBBLE

FIG.4


10
11
10
11
10
CARRIER WAVE AREA
ADDRESS AREA
CARRIER WAVE AREA
ADDRESS AREA
CARRIER WAVE AREA
12
14
14
SPECIAL WAVE WOBBLE
CARRIER WAVE WOBBLE
CARRIER WAVE WOBBLE

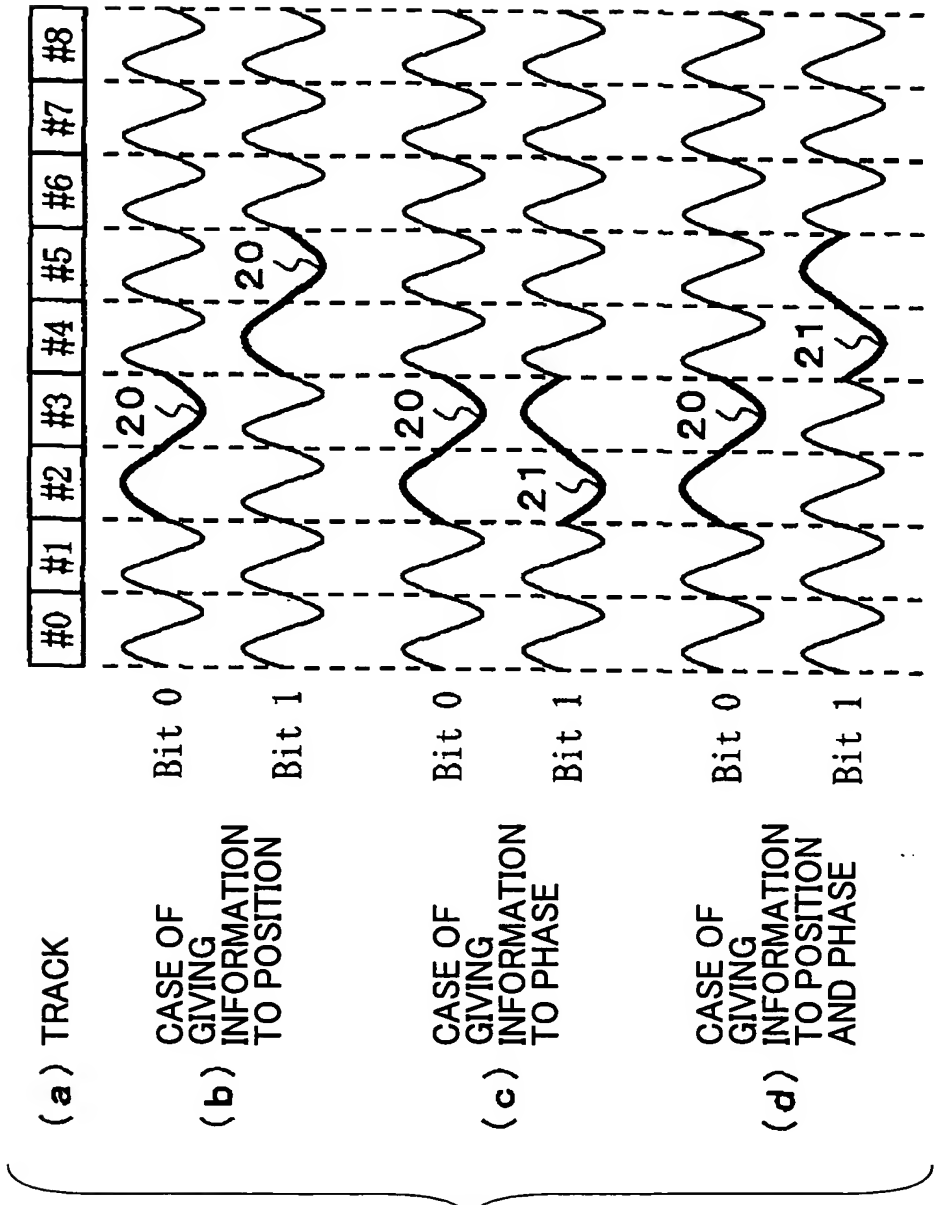

(a) TRACK
#0
#1
#2
#3
#4
#5
#6
#7
#8
(b) CASE OF GIVING INFORMATION TO POSITION
Bit 0
Bit 1
(c) CASE OF GIVING INFORMATION TO PHASE
Bit 0
Bit 1
(d) CASE OF GIVING INFORMATION TO POSITION AND PHASE
Bit 0
Bit 1
20
21

FIG.5

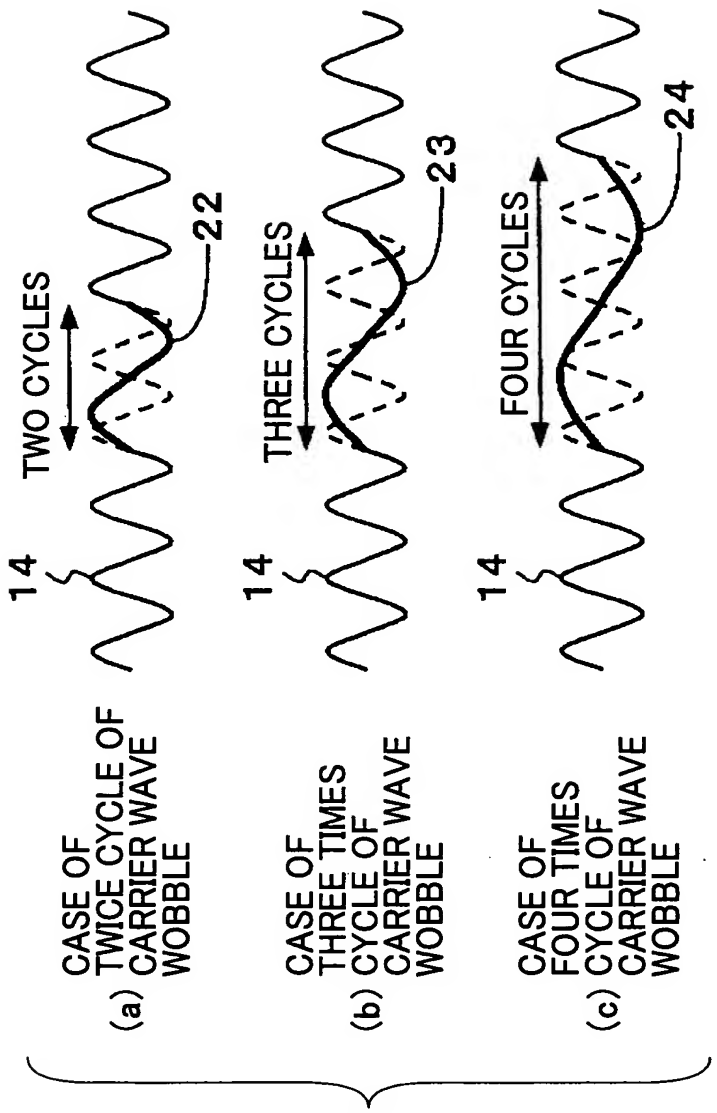

14
TWO CYCLES
22
CASE OF TWICE CYCLE OF CARRIER WAVE WOBBLE
(a)
14
THREE CYCLES
23
CASE OF THREE TIMES CYCLE OF CARRIER WAVE WOBBLE
(b)
14
FOUR CYCLES
24
CASE OF FOUR TIMES CYCLE OF CARRIER WAVE WOBBLE
(c)

FIG.6

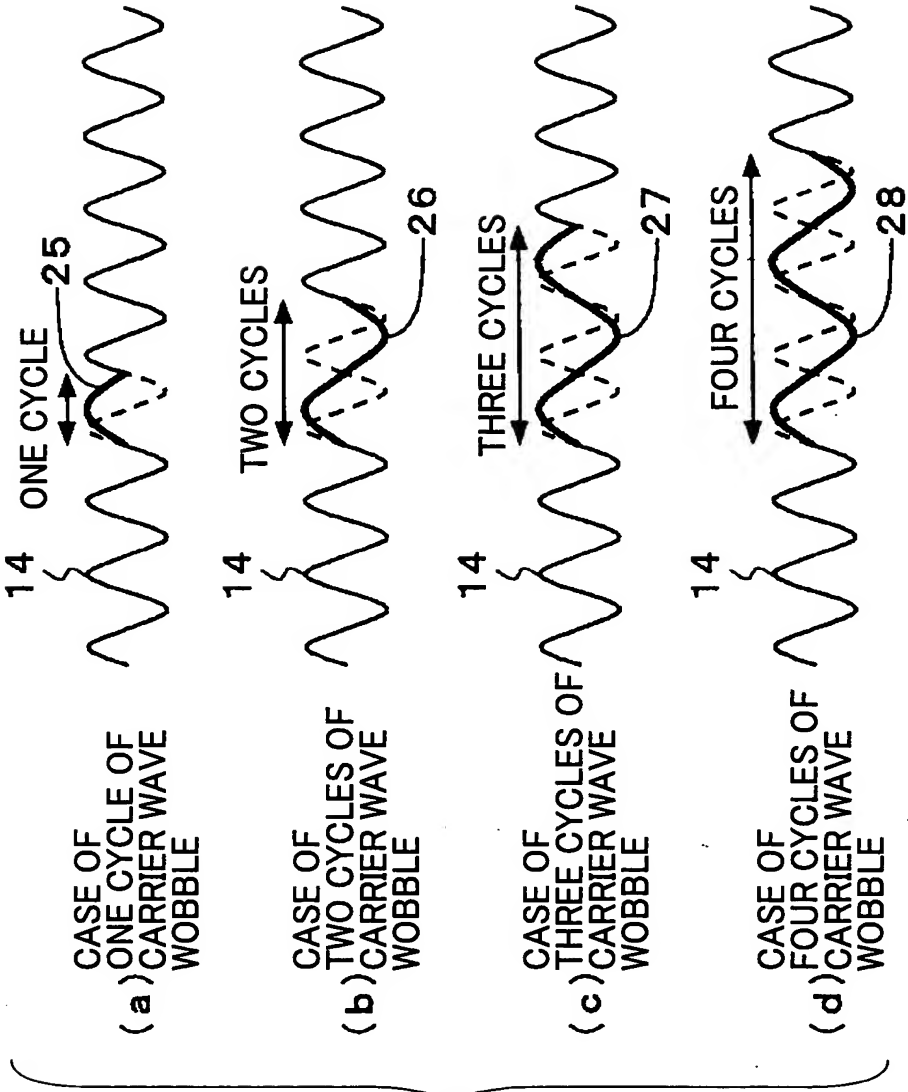

14
ONE CYCLE
25
CASE OF (a) ONE CYCLE OF CARRIER WAVE WOBBLE
14
TWO CYCLES
26
CASE OF (b) TWO CYCLES OF CARRIER WAVE WOBBLE
14
THREE CYCLES
27
CASE OF (c) THREE CYCLES OF CARRIER WAVE WOBBLE
14
FOUR CYCLES
28
CASE OF (d) FOUR CYCLES OF CARRIER WAVE WOBBLE

FIG.7

FIG.8

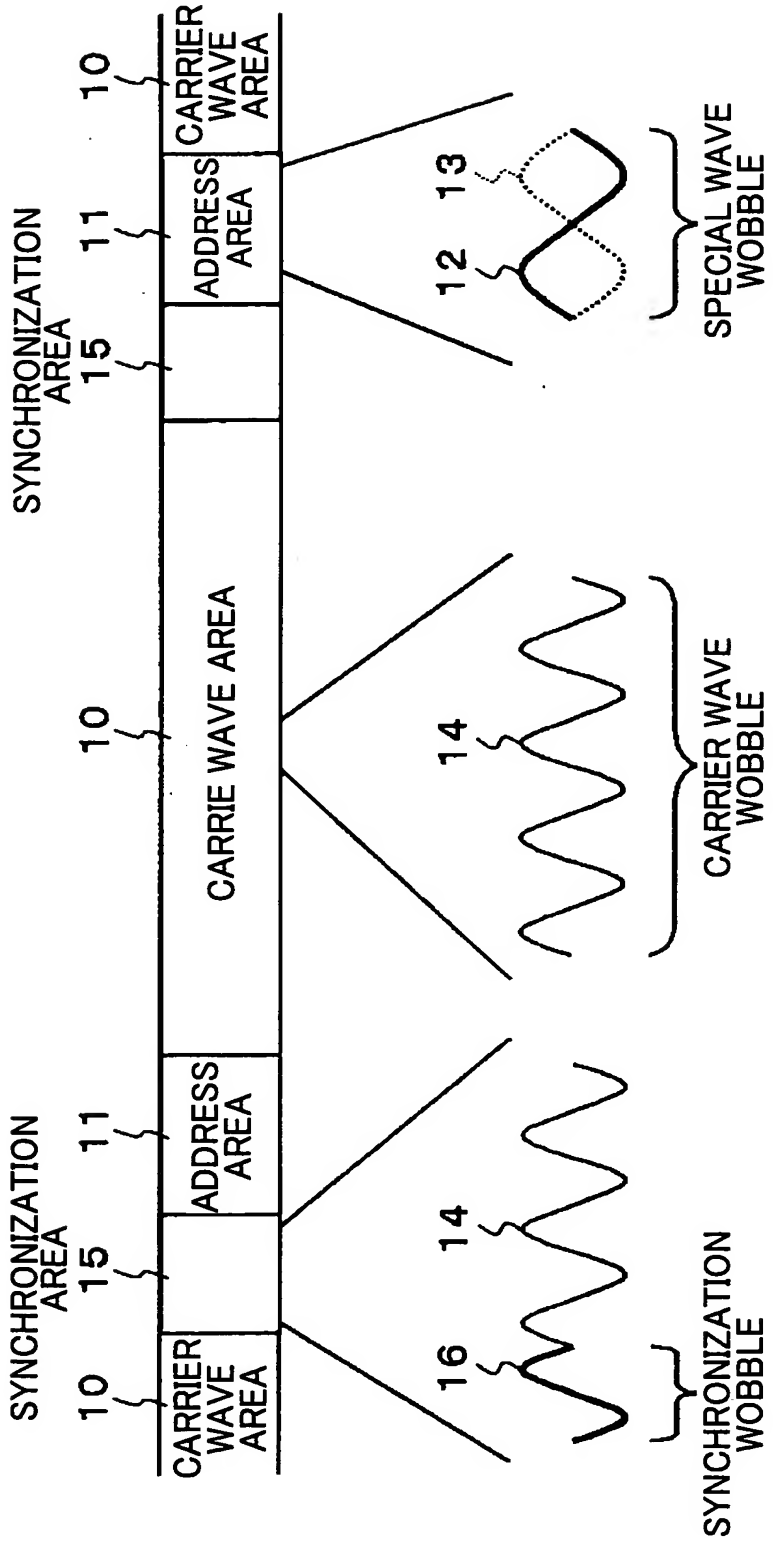

CARRIER WAVE AREA
10
SYNCHRONIZATION AREA
15
ADDRESS AREA
11
CARRIE WAVE AREA
10
SYNCHRONIZATION AREA
15
ADDRESS AREA
11
CARRIER WAVE AREA
10
16
14
CARRIER WAVE WOBBLE
14
12
13
SPECIAL WAVE WOBBLE
SYNCHRONIZATION WOBBLE

FIG.9

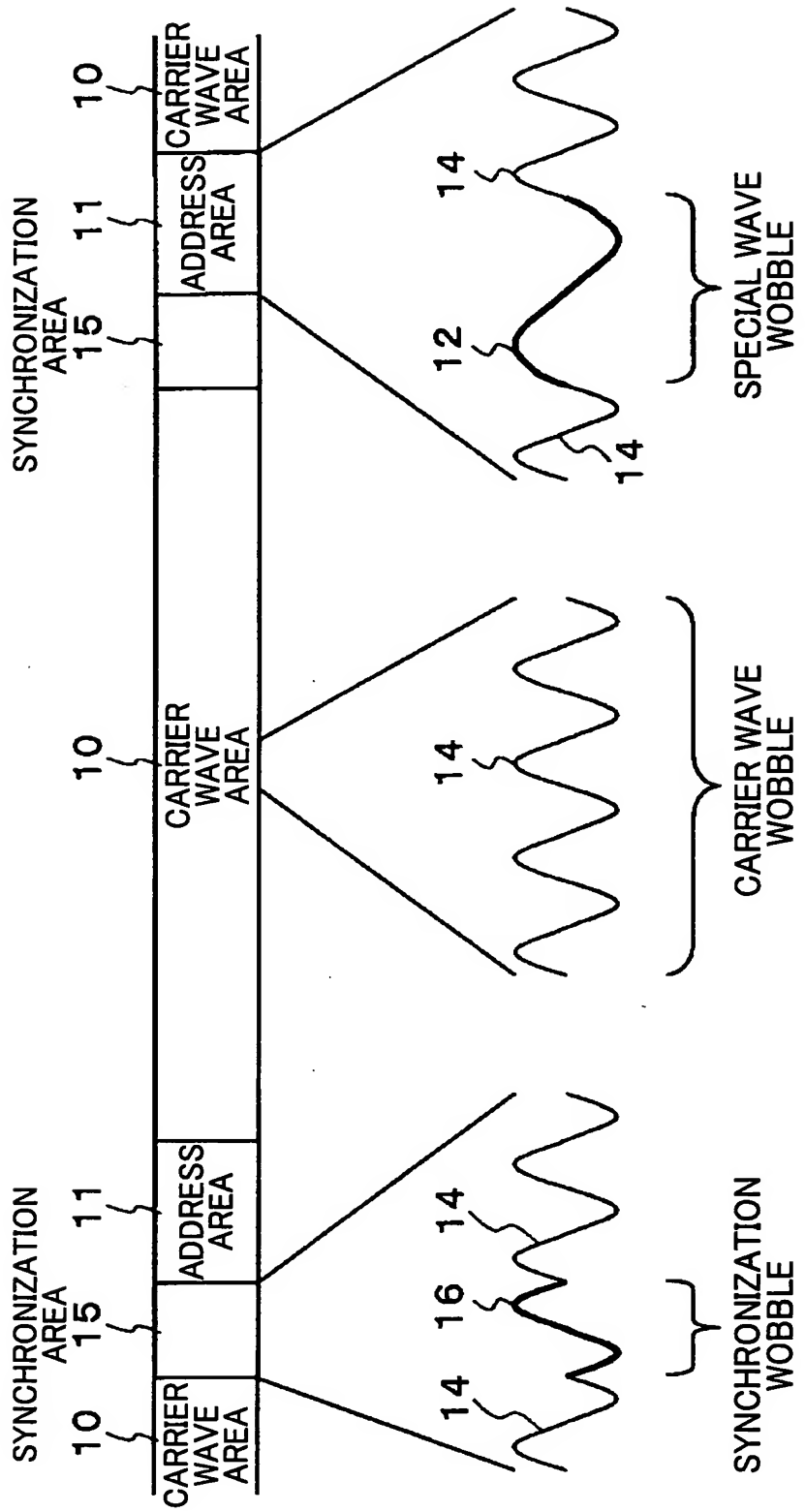

SYNCHRONIZATION AREA
15
ADDRESS AREA
11
CARRIER WAVE AREA
10
SYNCHRONIZATION WOBBLE
CARRIER WAVE WOBBLE
SPECIAL WAVE WOBBLE
12
14
16

FIG.10

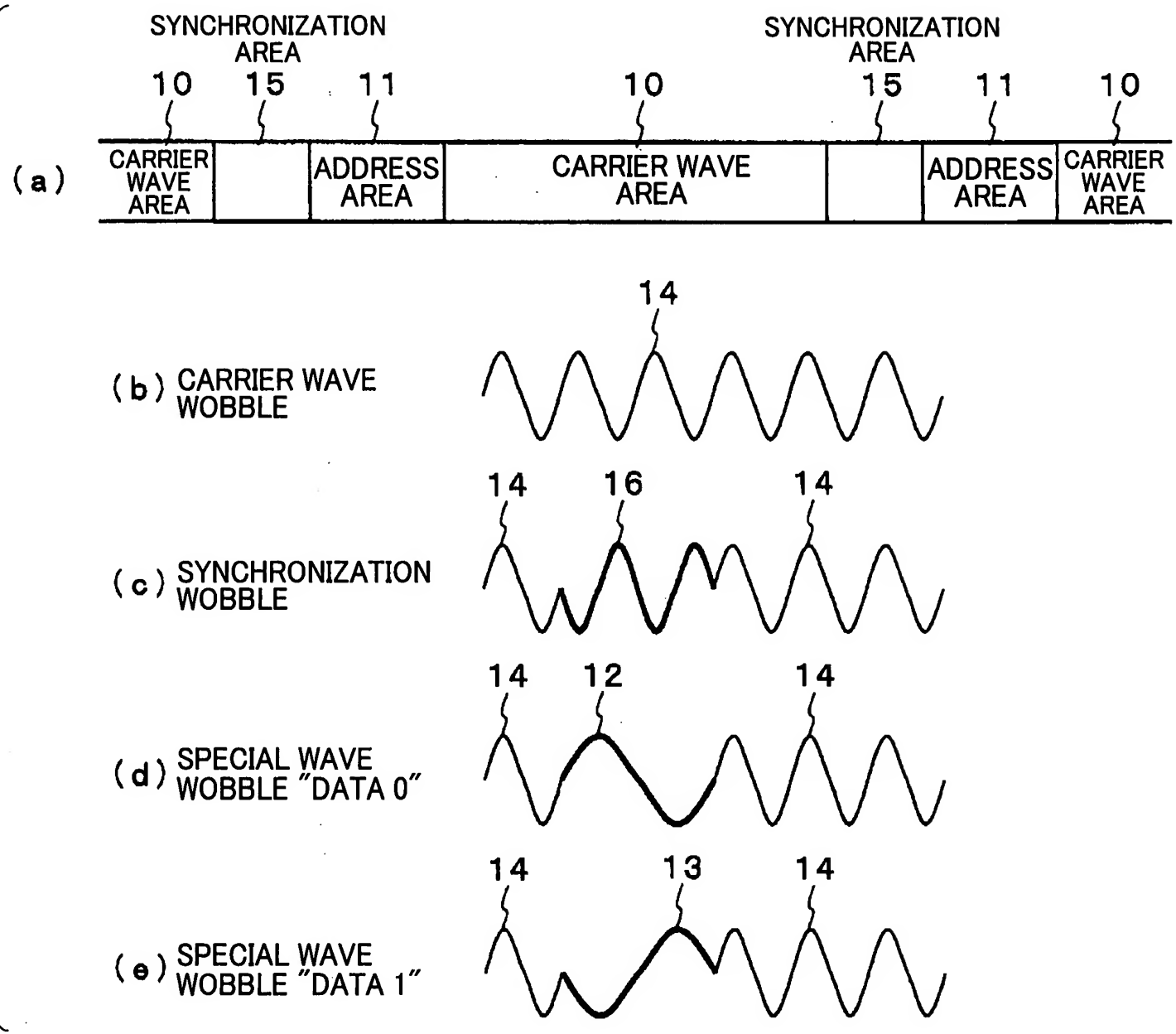


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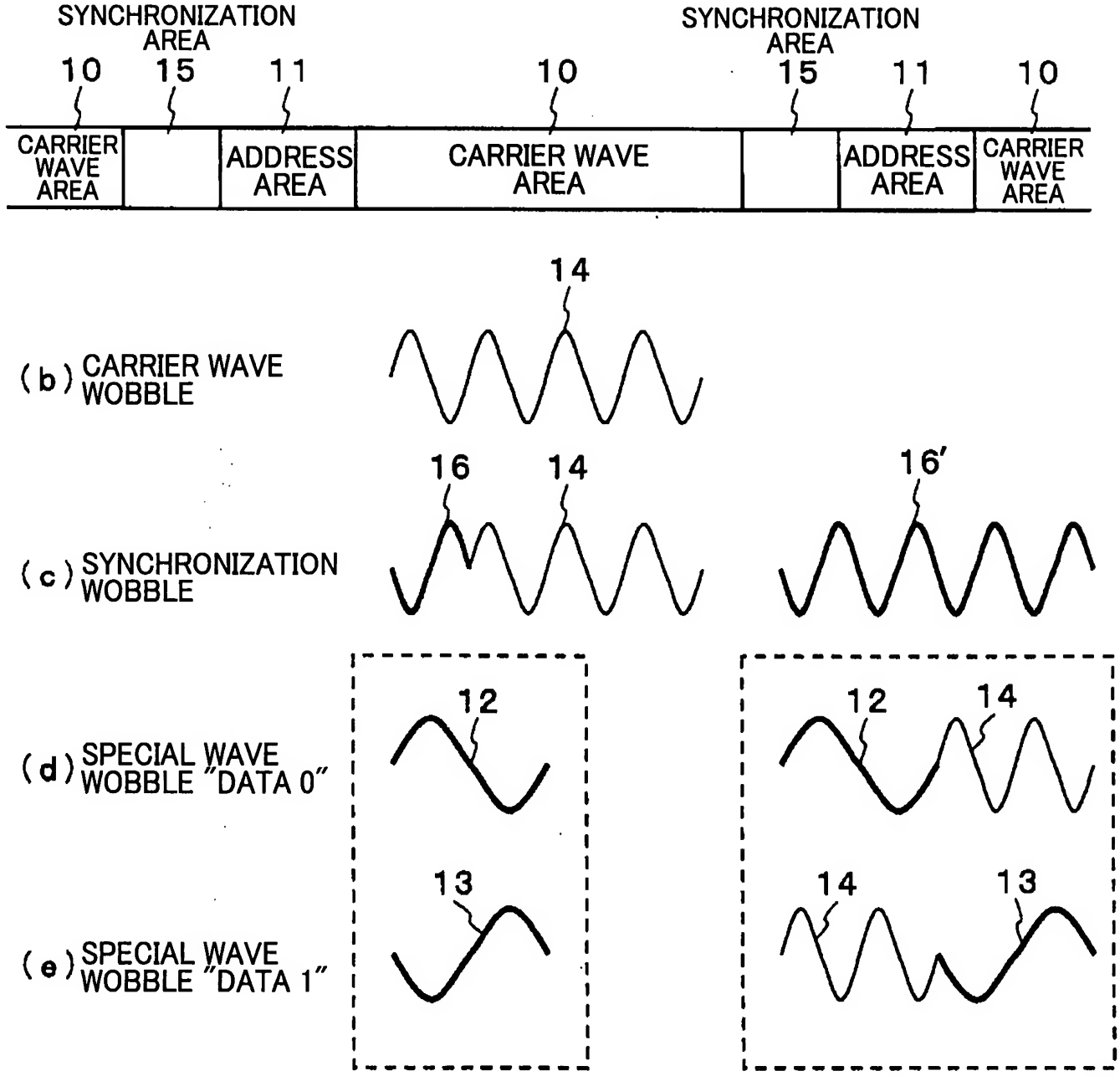
FIG.11



10/540859

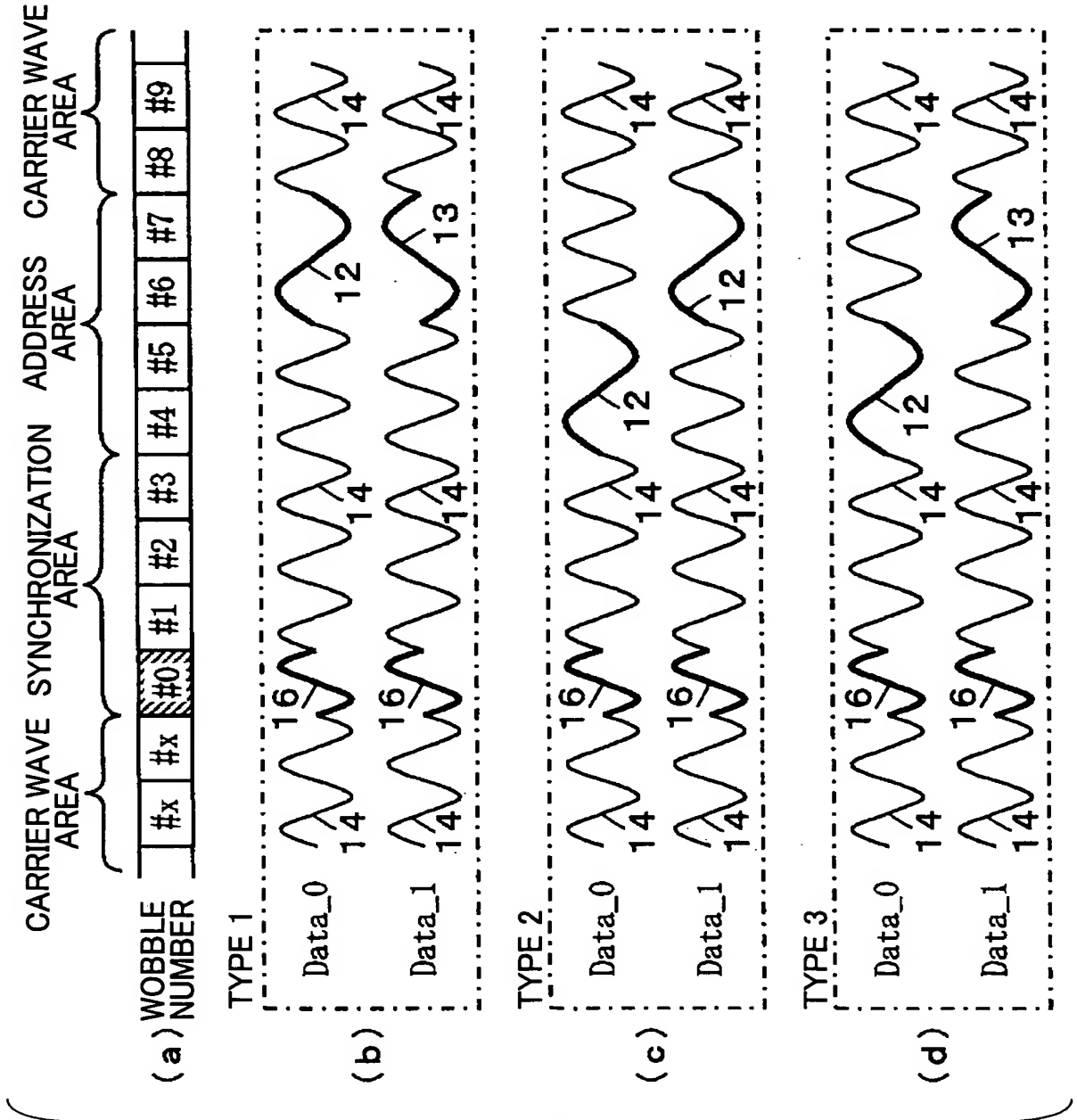

CARRIER WAVE AREA
SYNCHRONIZATION AREA
ADDRESS AREA
CARRIER WAVE AREA
(a) WOBBLE NUMBER
#x
#x
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
(b)
TYPE 1
Data_0
Data_1
(c)
TYPE 2
Data_0
Data_1
(d)
TYPE 3
Data_0
Data_1
16
14
12
13

FIG.12

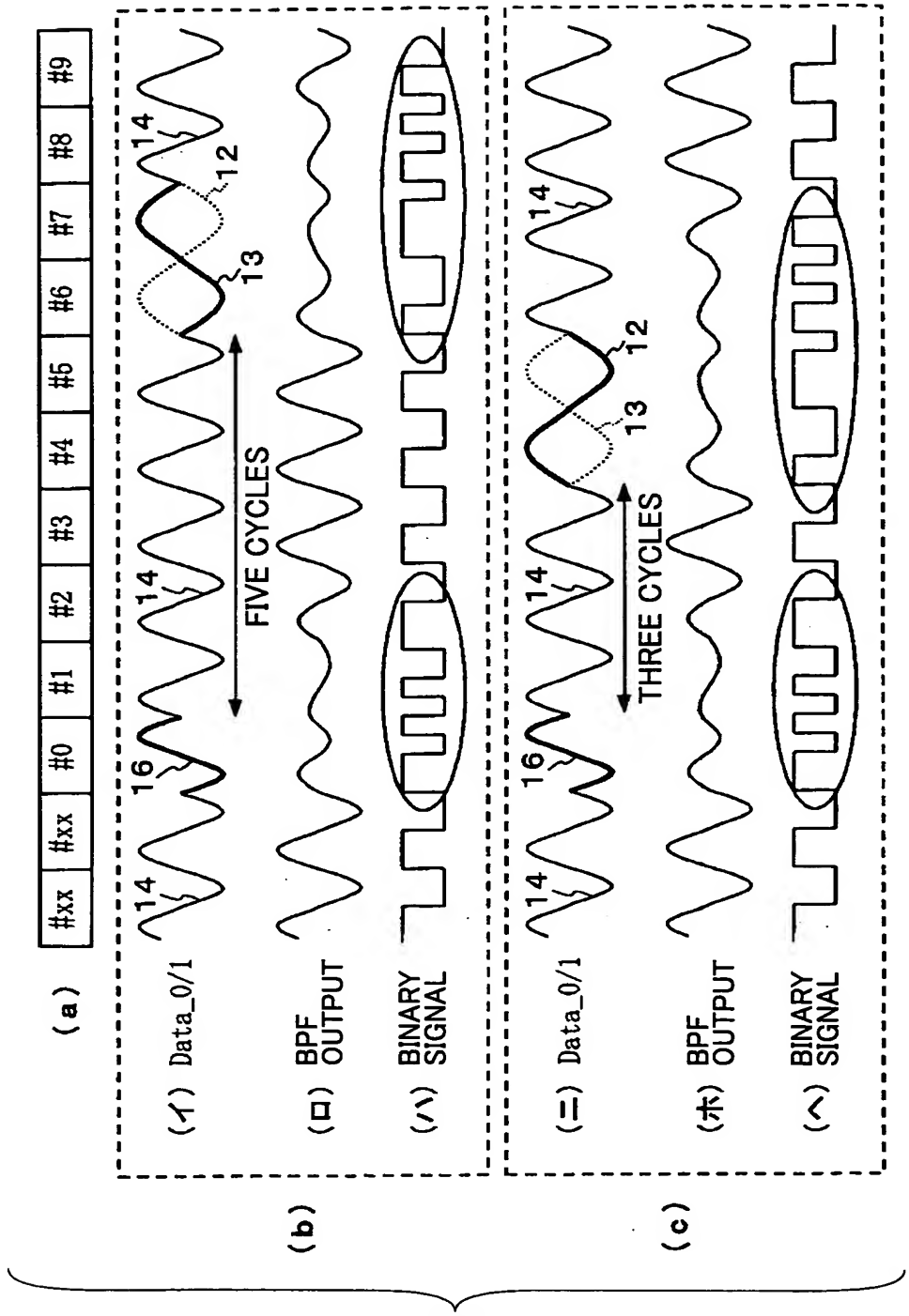

(a)
#xx
#xx
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
(b)
(イ) Data_0/1
(ロ) BPF OUTPUT
(ハ) BINARY SIGNAL
FIVE CYCLES
(c)
(ニ) Data_0/1
(ホ) BPF OUTPUT
(ヘ) BINARY SIGNAL
THREE CYCLES
12
13
14
16

FIG.13

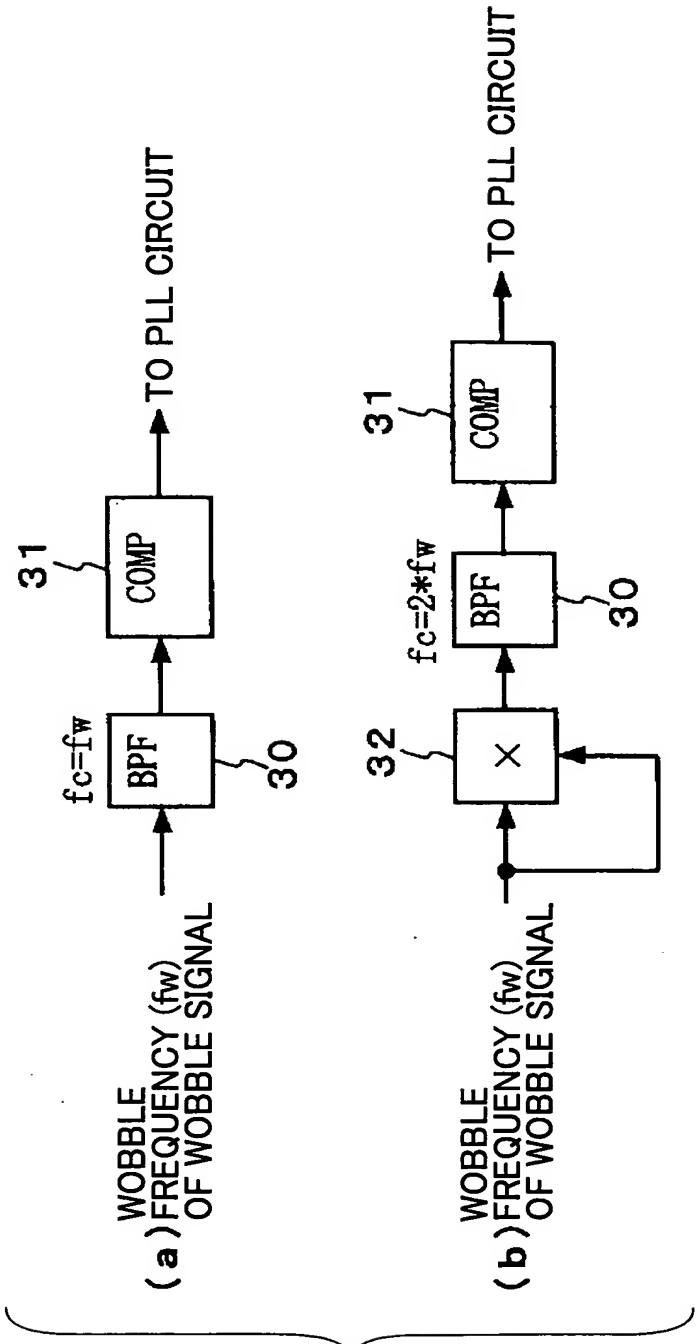

(a) WOBBLE FREQUENCY (fw) OF WOBBLE SIGNAL
fc=fw
BPF
30
31
COMP
TO PLL CIRCUIT
(b) WOBBLE FREQUENCY (fw) OF WOBBLE SIGNAL
32
×
fc=2*fw
BPF
30
31
COMP
TO PLL CIRCUIT

FIG.14

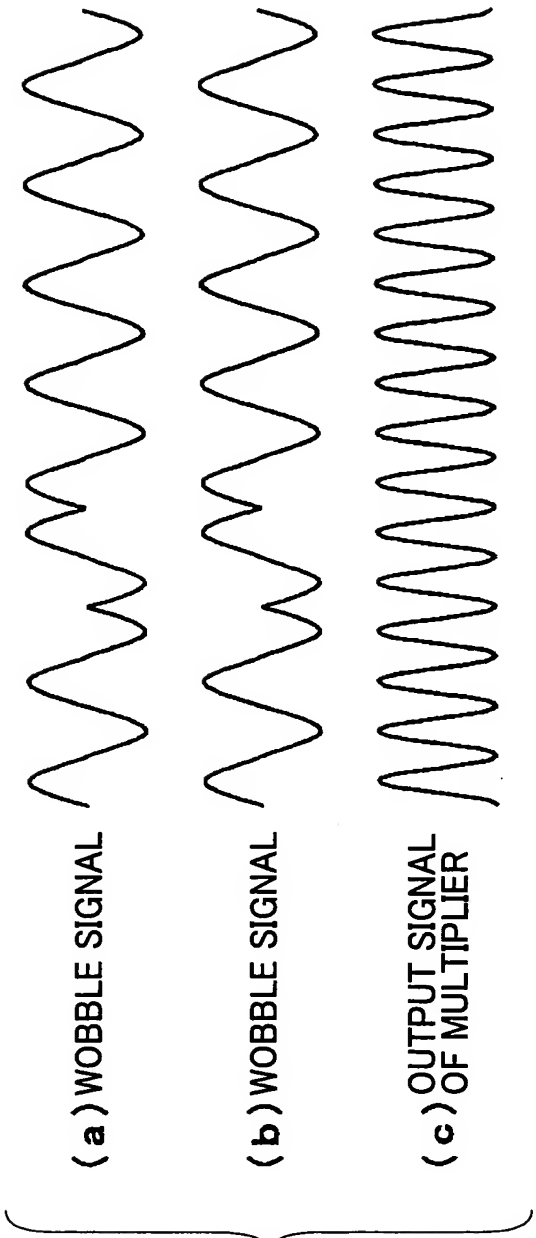

(a) WOBBLE SIGNAL
(b) WOBBLE SIGNAL
(c) OUTPUT SIGNAL OF MULTIPLIER

FIG.15

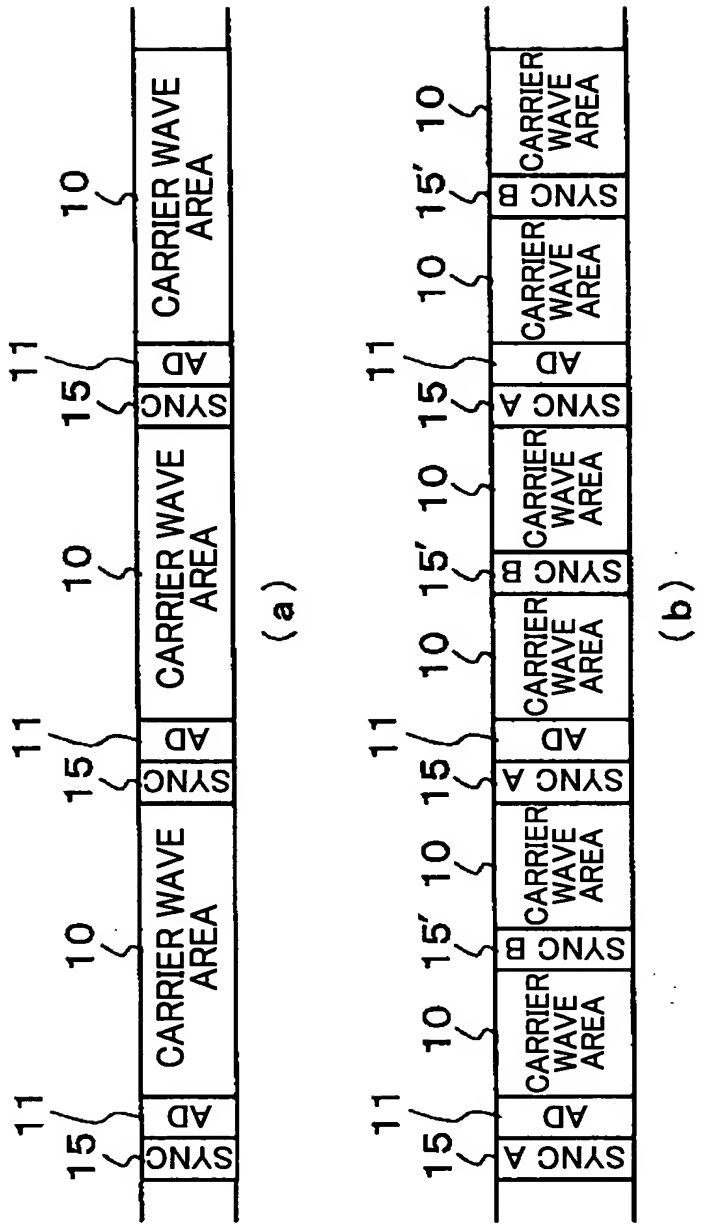
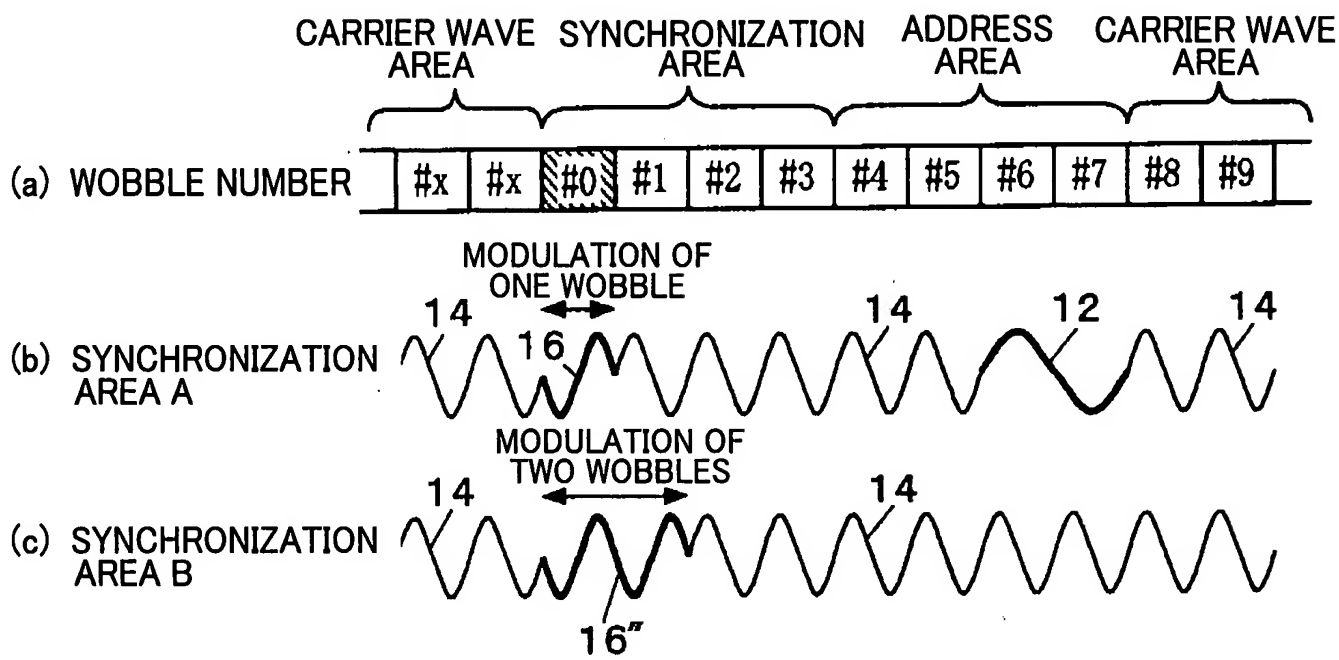


FIG.16

FIG.17



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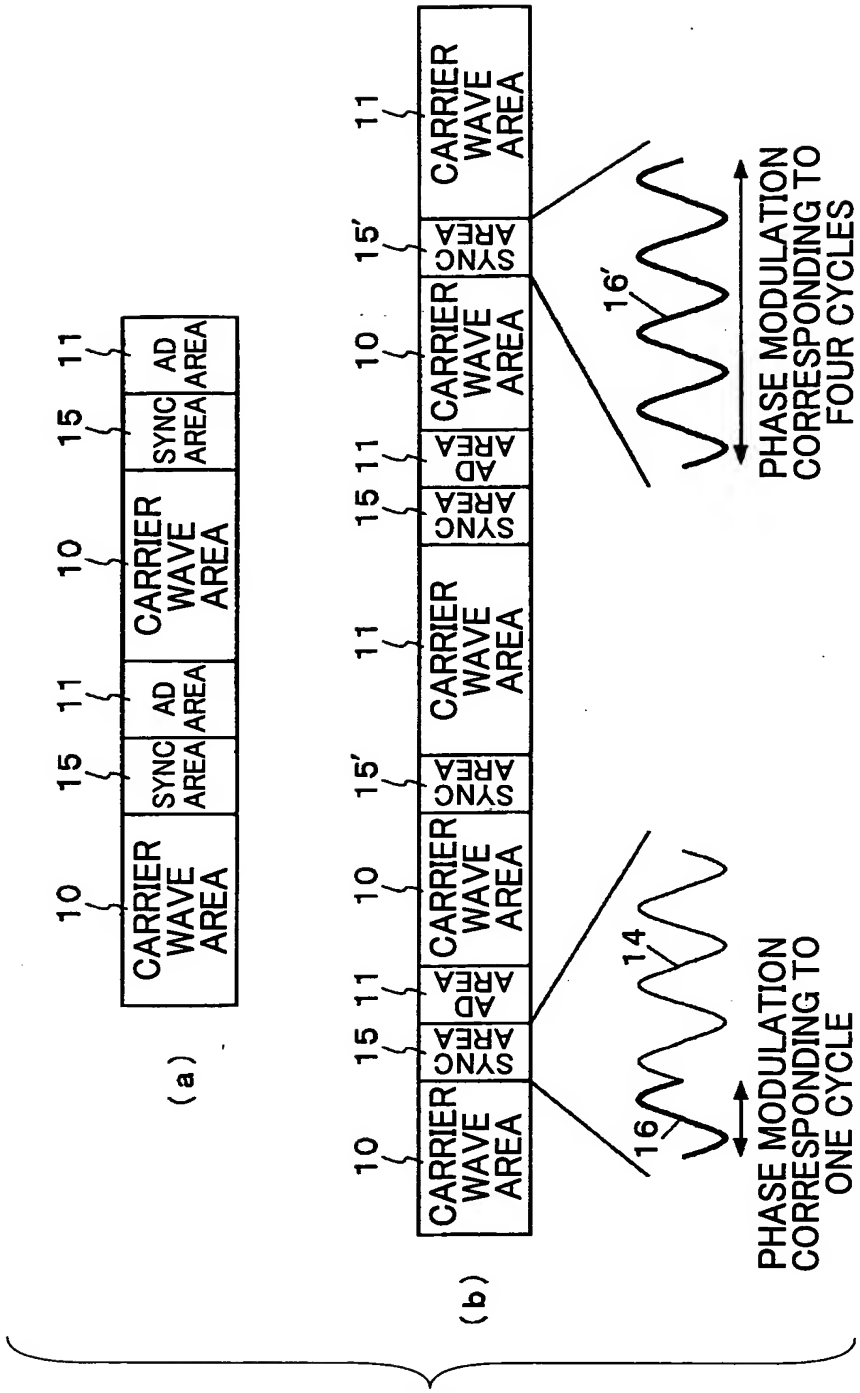

(a)
CARRIER WAVE AREA
10
SYNC AREA
15
AD AREA
11
CARRIER WAVE AREA
10
SYNC AREA
15
AD AREA
11
(b)
CARRIER WAVE AREA
10
SYNC AREA
15
AD AREA
11
CARRIER WAVE AREA
10
SYNC AREA
15'
AD AREA
11
CARRIER WAVE AREA
10
SYNC AREA
15'
AD AREA
11
CARRIER WAVE AREA
10
14
16
PHASE MODULATION CORRESPONDING TO ONE CYCLE
16'
PHASE MODULATION CORRESPONDING TO FOUR CYCLES

FIG.18

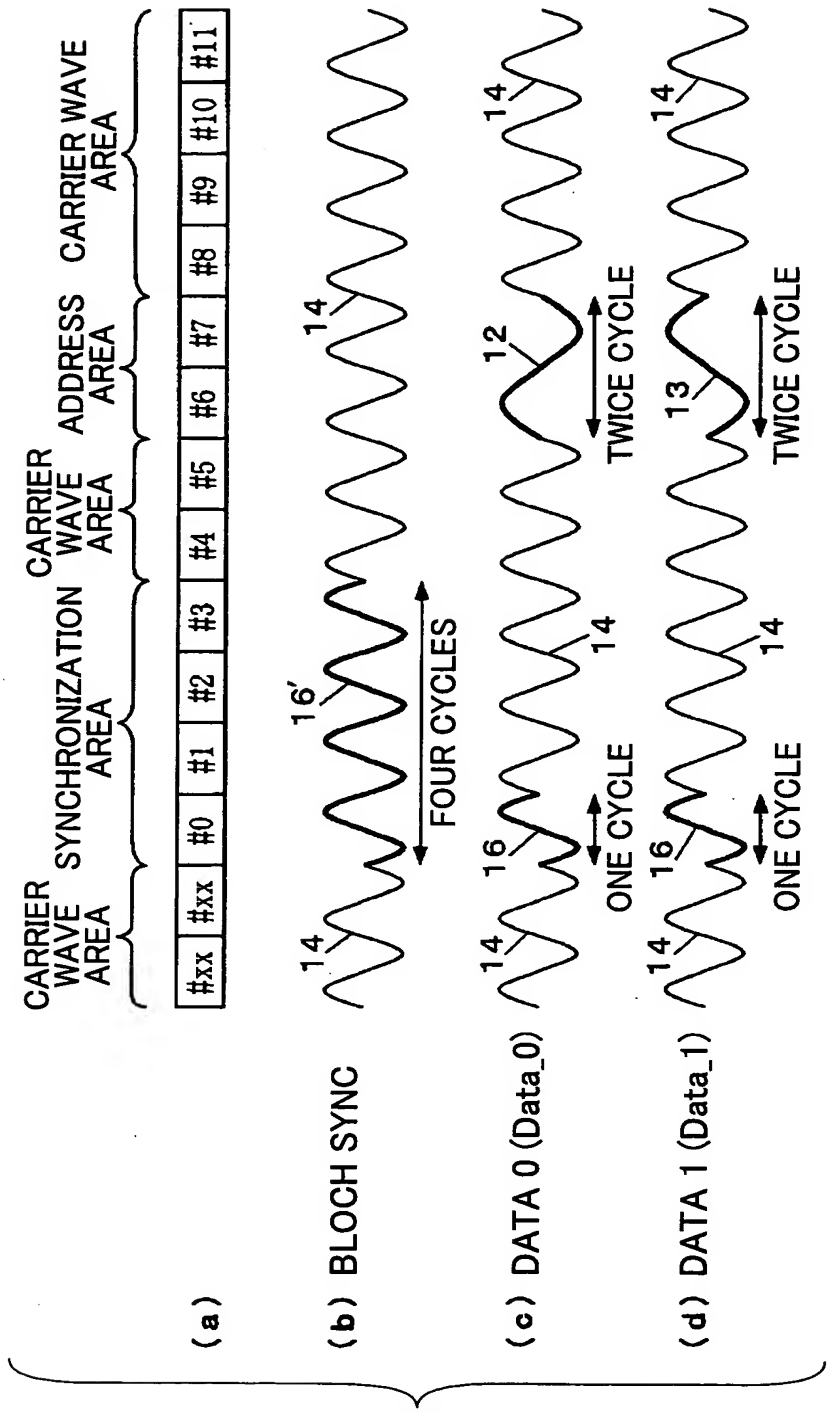

(a)
CARRIER WAVE AREA
SYNCHRONIZATION AREA
CARRIER WAVE AREA
ADDRESS AREA
CARRIER WAVE AREA
#xx
#xx
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
#11
(b) BLOCH SYNC
(c) DATA 0 (Data_0)
(d) DATA 1 (Data_1)
14
16
16'
12
13
FOUR CYCLES
ONE CYCLE
TWICE CYCLE

FIG.19

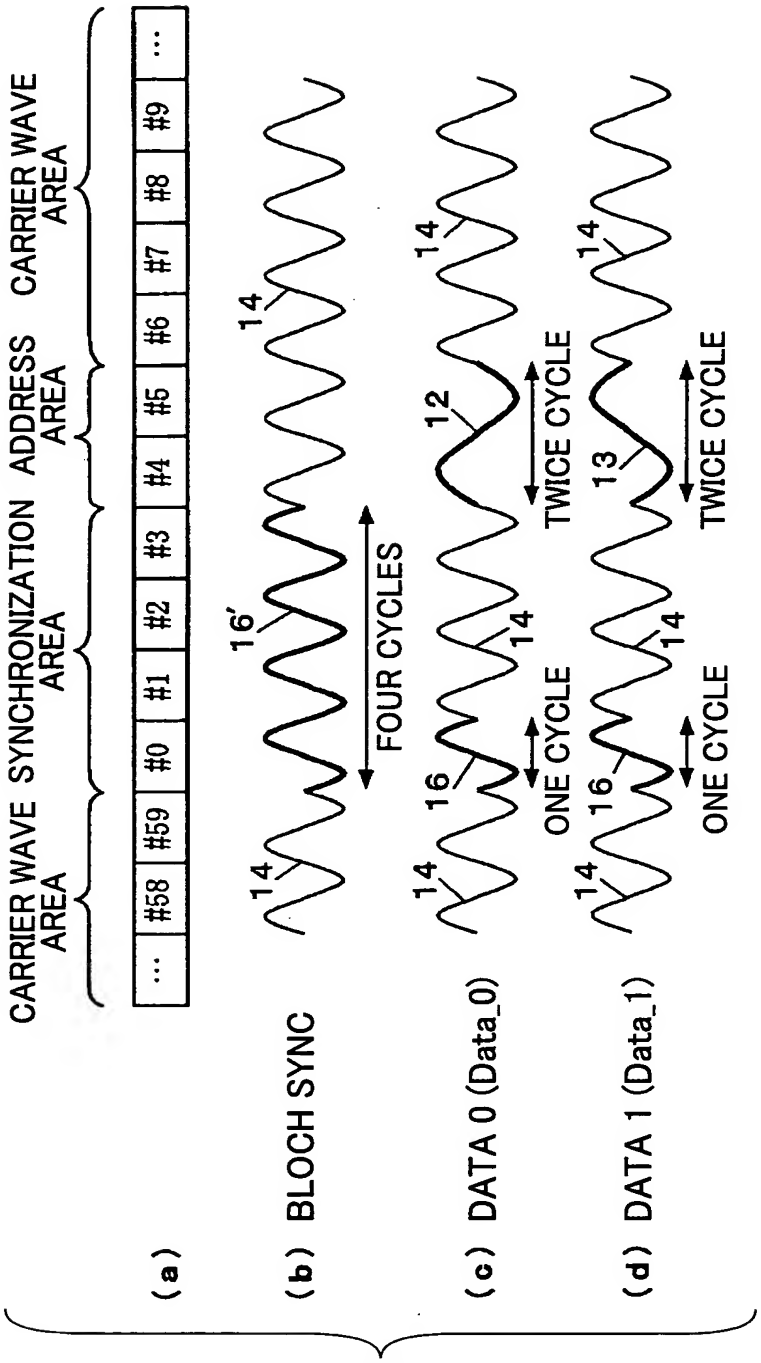

CARRIER WAVE AREA
SYNCHRONIZATION AREA
ADDRESS AREA
CARRIER WAVE AREA
... #58 #59 #0 #1 #2 #3 #4 #5 #6 #7 #8 #9 ...
(a)
(b) BLOCH SYNC
(c) DATA 0 (Data_0)
(d) DATA 1 (Data_1)
14
16'
16
12
13
FOUR CYCLES
ONE CYCLE
TWICE CYCLE

FIG.20

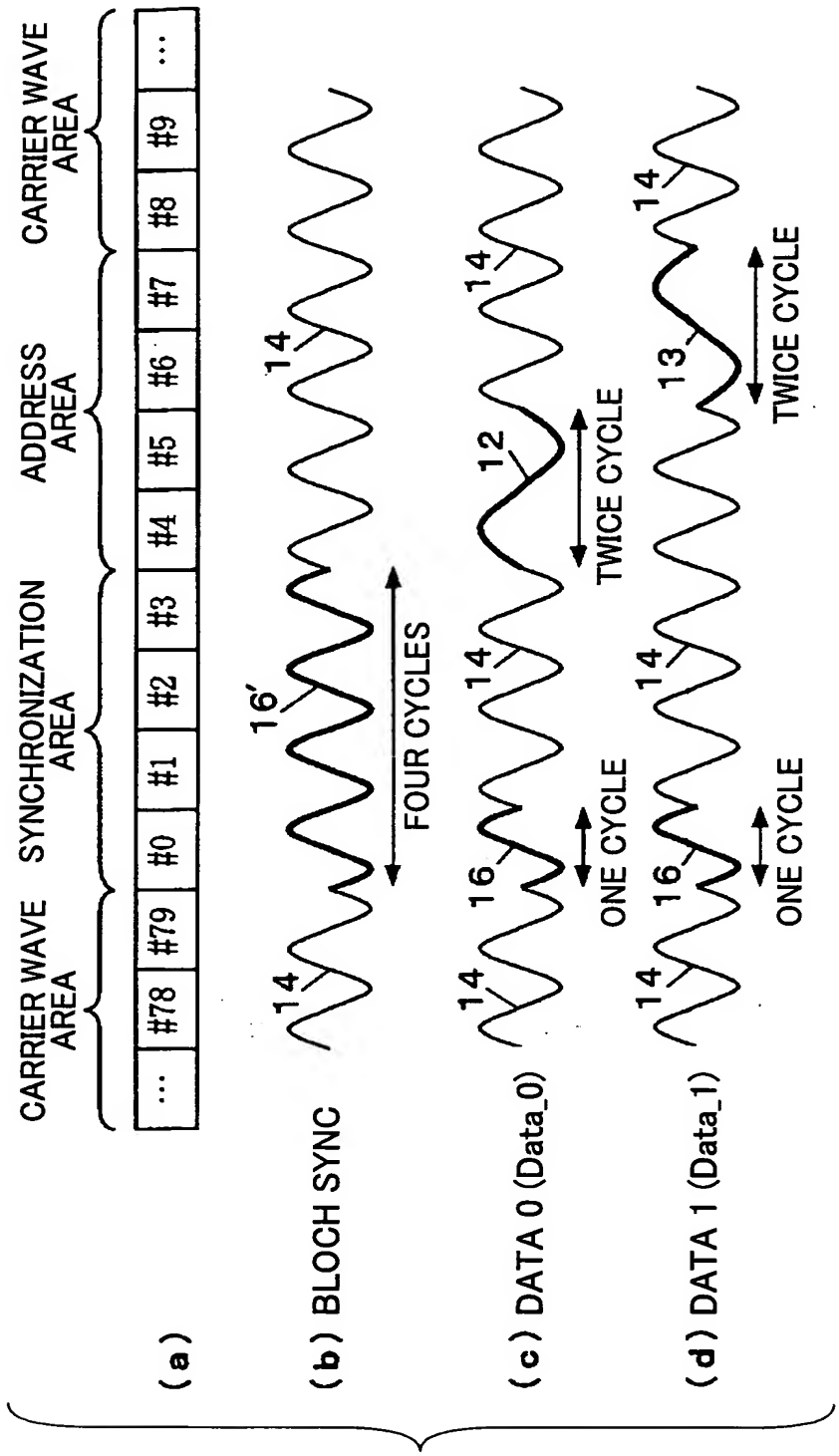

CARRIER WAVE AREA
SYNCHRONIZATION AREA
ADDRESS AREA
CARRIER WAVE AREA
#78
#79
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
(a)
(b) BLOCH SYNC
(c) DATA 0 (Data_0)
(d) DATA 1 (Data_1)
FOUR CYCLES
ONE CYCLE
TWICE CYCLE
ONE CYCLE
TWICE CYCLE
14
16'
16
12
13

FIG.21

FIG.22

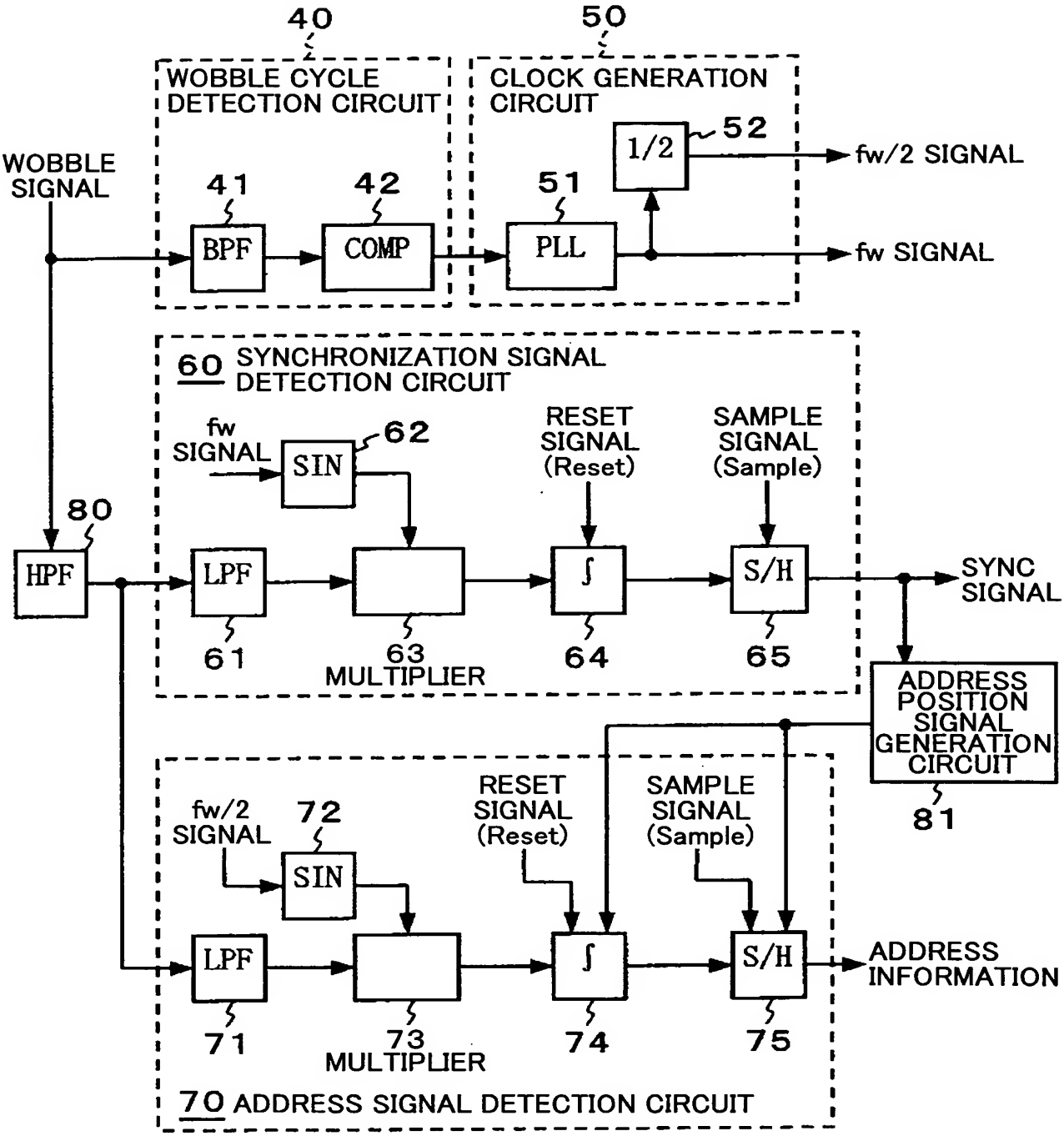

40
50
WOBBLE CYCLE DETECTION CIRCUIT
CLOCK GENERATION CIRCUIT
WOBBLE SIGNAL
41
42
51
52
BPF
COMP
PLL
1/2
fw/2 SIGNAL
fw SIGNAL
60 SYNCHRONIZATION SIGNAL DETECTION CIRCUIT
fw SIGNAL
62
SIN
RESET SIGNAL (Reset)
SAMPLE SIGNAL (Sample)
80
HPF
LPF
∫
S/H
SYNC SIGNAL
61
63
MULTIPLIER
64
65
ADDRESS POSITION SIGNAL GENERATION CIRCUIT
81
fw/2 SIGNAL
72
SIN
RESET SIGNAL (Reset)
SAMPLE SIGNAL (Sample)
LPF
∫
S/H
ADDRESS INFORMATION
71
73
MULTIPLIER
74
75
70 ADDRESS SIGNAL DETECTION CIRCUIT

FIG.23

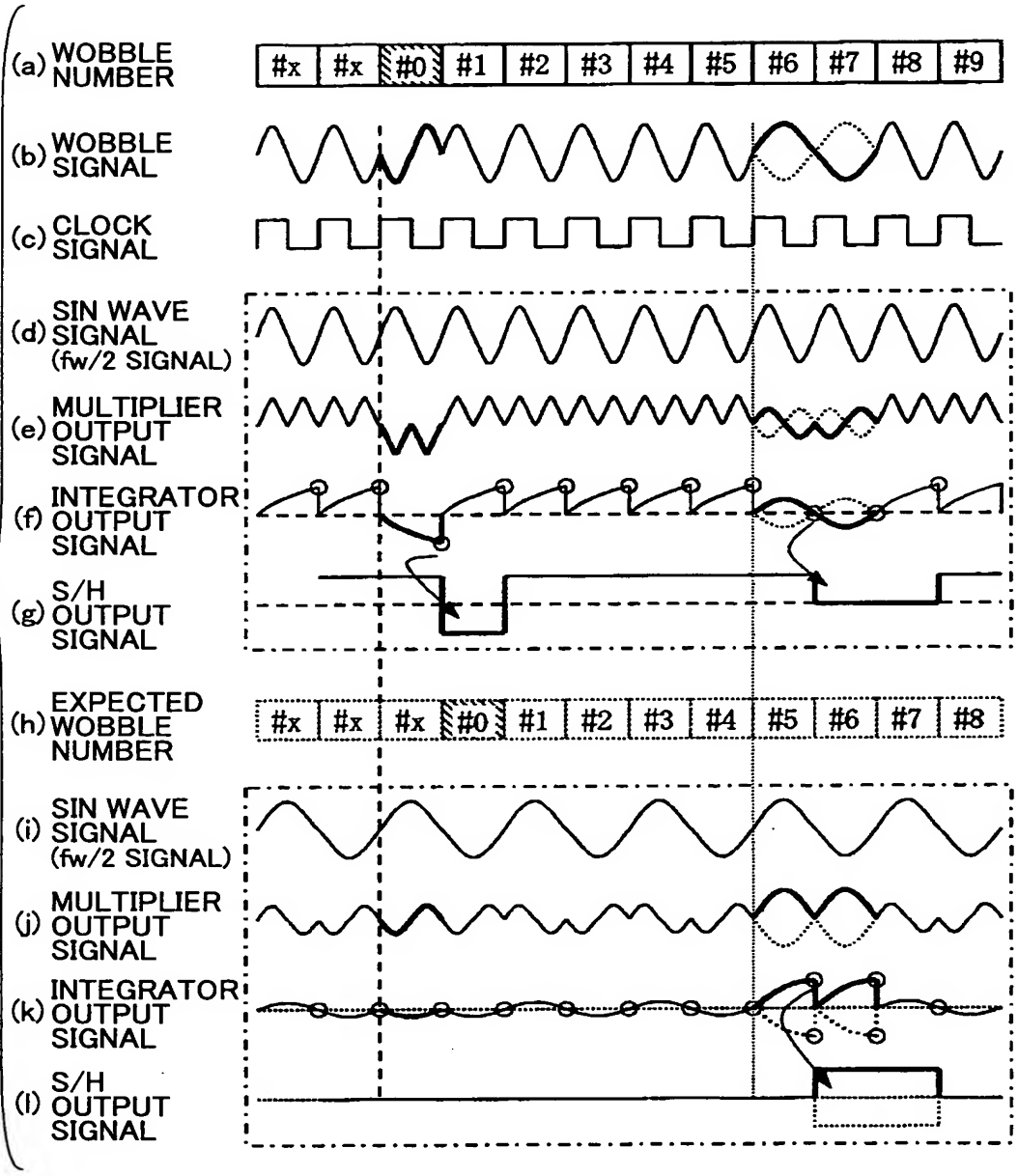
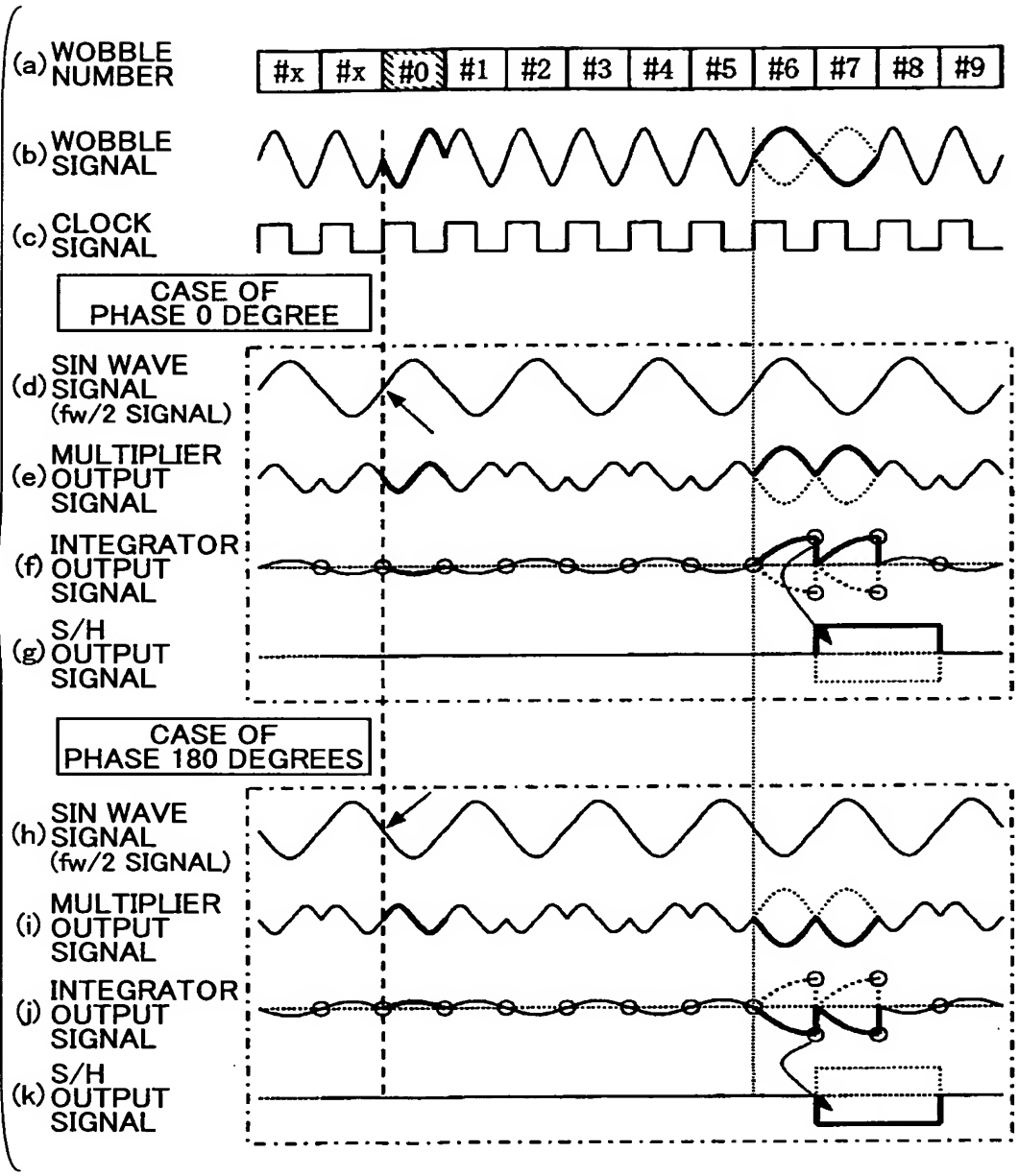

(a) WOBBLE NUMBER
#x
#x
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
(b) WOBBLE SIGNAL
(c) CLOCK SIGNAL
(d) SIN WAVE SIGNAL (fw/2 SIGNAL)
(e) MULTIPLIER OUTPUT SIGNAL
(f) INTEGRATOR OUTPUT SIGNAL
(g) S/H OUTPUT SIGNAL
(h) EXPECTED WOBBLE NUMBER
#x
#x
#x
#0
#1
#2
#3
#4
#5
#6
#7
#8
(i) SIN WAVE SIGNAL (fw/2 SIGNAL)
(j) MULTIPLIER OUTPUT SIGNAL
(k) INTEGRATOR OUTPUT SIGNAL
(l) S/H OUTPUT SIGNAL

FIG.24


(a) WOBBLE NUMBER
#x
#x
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
(b) WOBBLE SIGNAL
(c) CLOCK SIGNAL
CASE OF PHASE 0 DEGREE
(d) SIN WAVE SIGNAL (fw/2 SIGNAL)
(e) MULTIPLIER OUTPUT SIGNAL
(f) INTEGRATOR OUTPUT SIGNAL
(g) S/H OUTPUT SIGNAL
CASE OF PHASE 180 DEGREES
(h) SIN WAVE SIGNAL (fw/2 SIGNAL)
(i) MULTIPLIER OUTPUT SIGNAL
(j) INTEGRATOR OUTPUT SIGNAL
(k) S/H OUTPUT SIGNAL

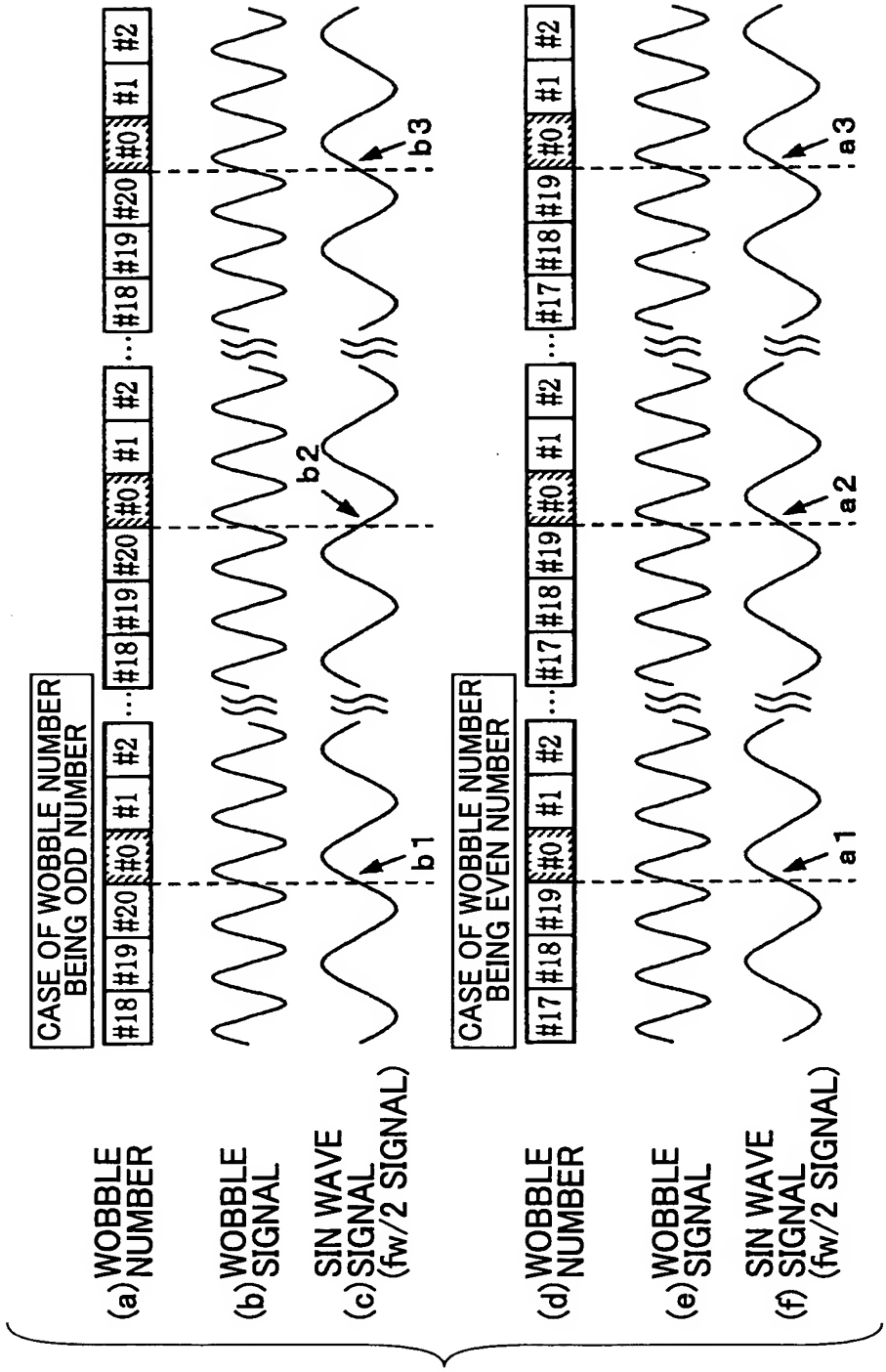

CASE OF WOBBLE NUMBER BEING ODD NUMBER
CASE OF WOBBLE NUMBER BEING EVEN NUMBER
(a) WOBBLE NUMBER
(b) WOBBLE SIGNAL
(c) SIN WAVE SIGNAL (fw/2 SIGNAL)
(d) WOBBLE NUMBER
(e) WOBBLE SIGNAL
(f) SIN WAVE SIGNAL (fw/2 SIGNAL)
#17 #18 #19 #20 #0 #1 #2 ... #17 #18 #19 #20 #0 #1 #2
#18 #19 #20 #0 #1 #2 ... #18 #19 #20 #0 #1 #2
a1
a2
a3
b1
b2
b3

FIG.25

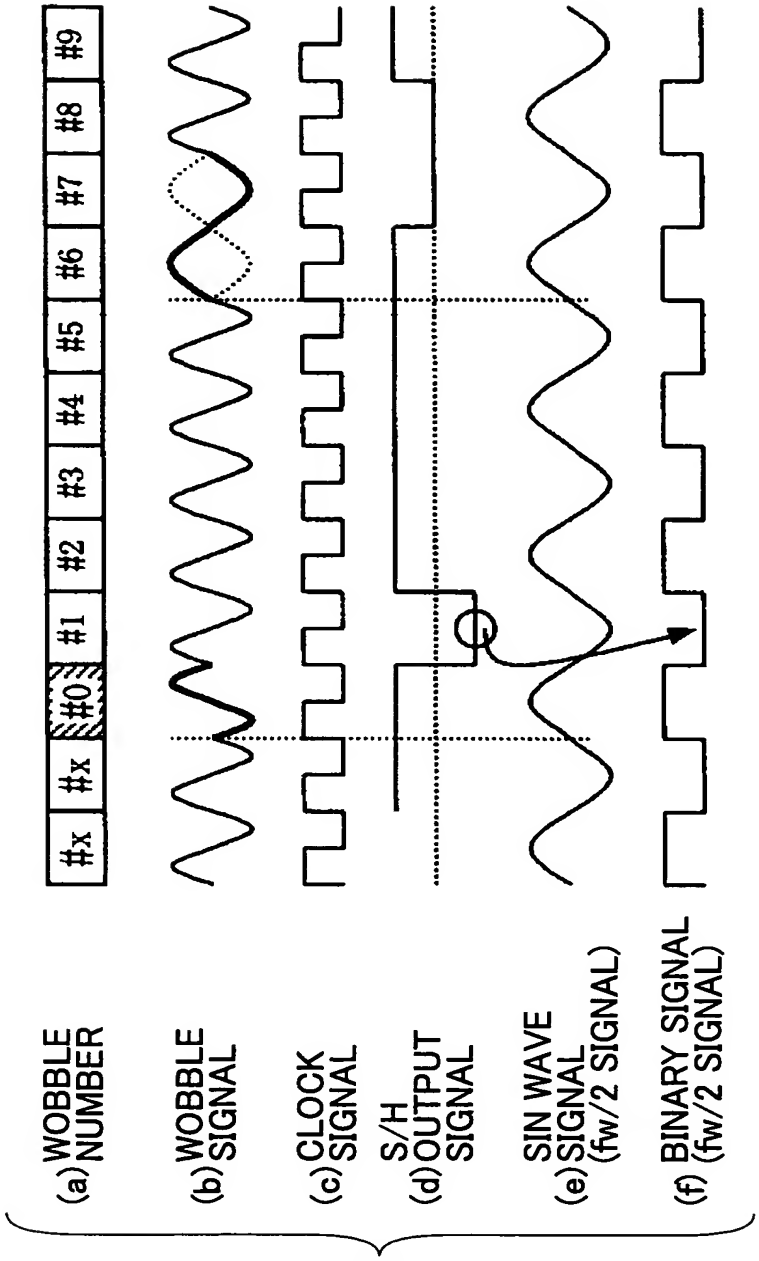

(a) WOBBLE NUMBER
#x
#x
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
(b) WOBBLE SIGNAL
(c) CLOCK SIGNAL
S/H
(d) OUTPUT SIGNAL
SIN WAVE
(e) SIGNAL (fw/2 SIGNAL)
(f) BINARY SIGNAL (fw/2 SIGNAL)

FIG.26

FIG.27

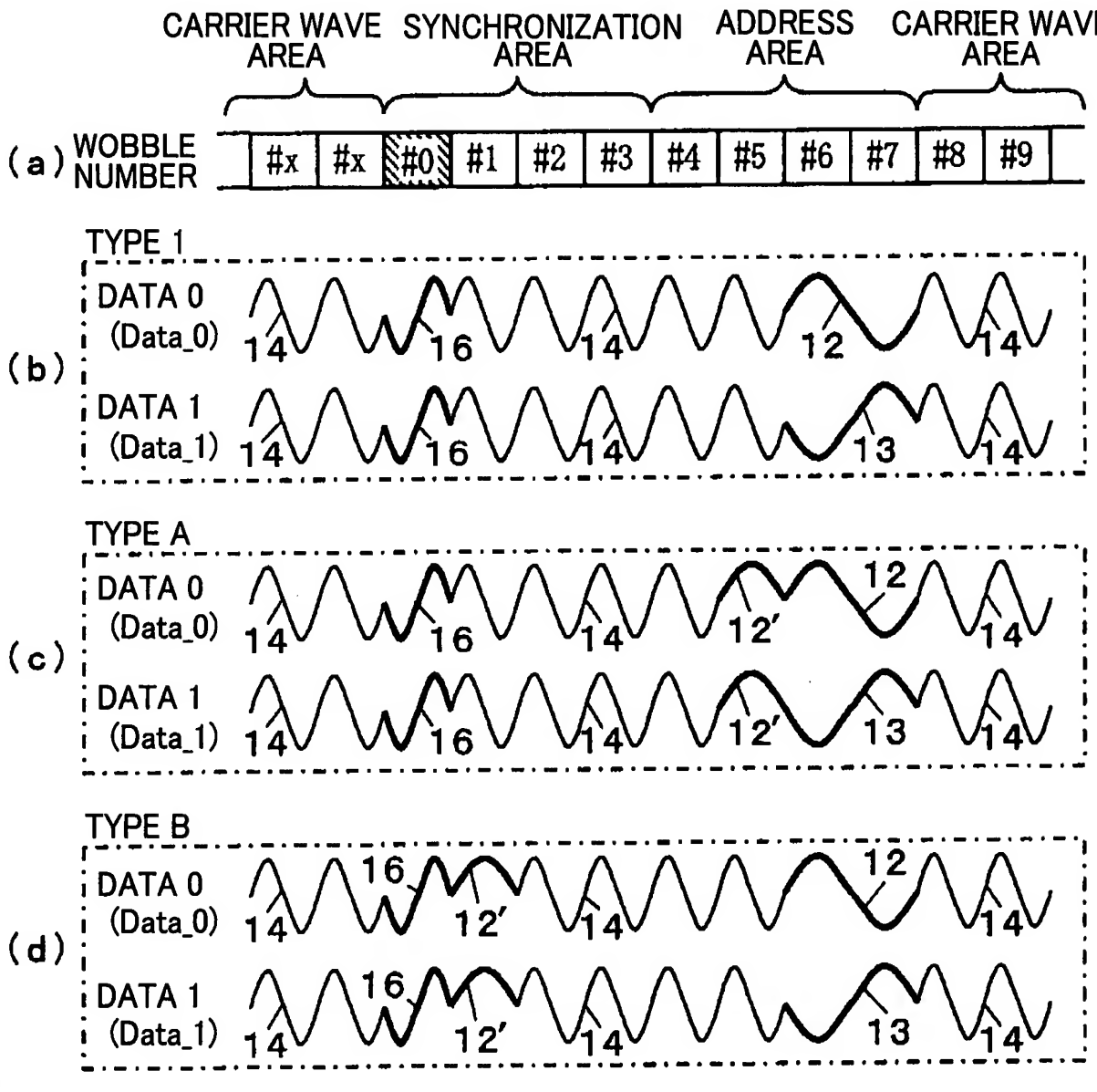


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FIG.28

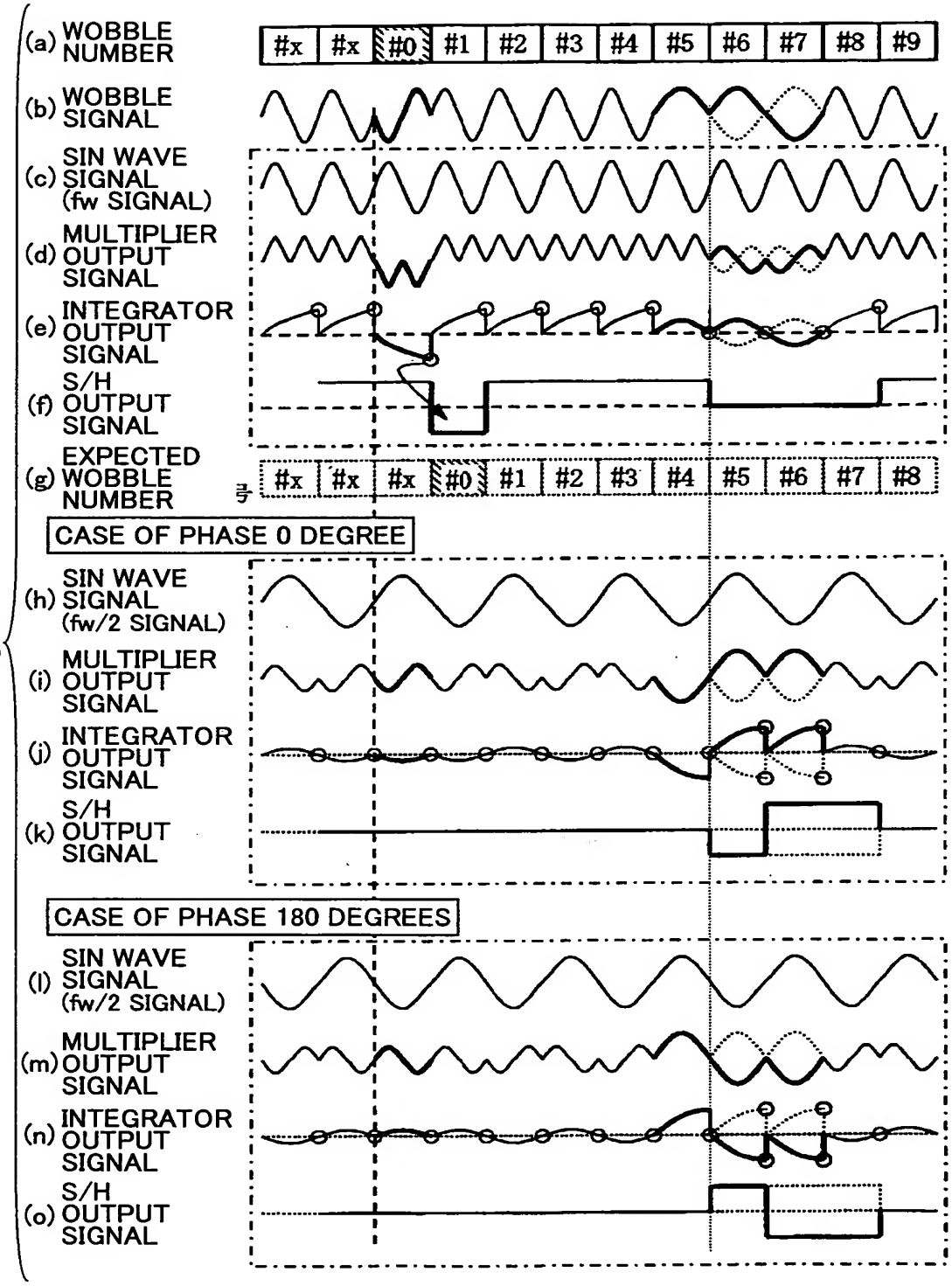
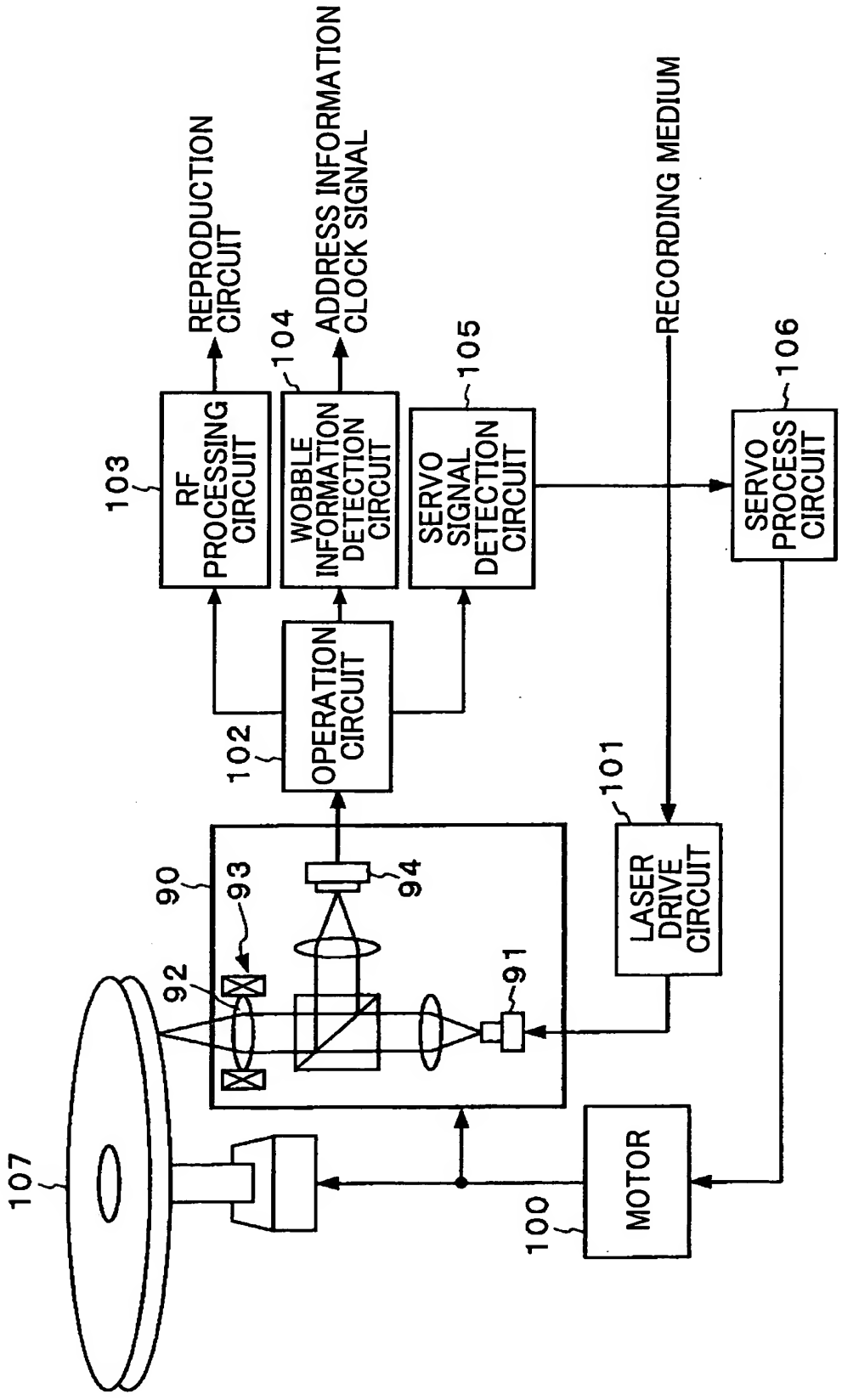

(a) WOBBLE NUMBER
#x
#x
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
(b) WOBBLE SIGNAL
(c) SIN WAVE SIGNAL (fw SIGNAL)
(d) MULTIPLIER OUTPUT SIGNAL
(e) INTEGRATOR OUTPUT SIGNAL
(f) S/H OUTPUT SIGNAL
(g) EXPECTED WOBBLE NUMBER
CASE OF PHASE 0 DEGREE
(h) SIN WAVE SIGNAL (fw/2 SIGNAL)
(i) MULTIPLIER OUTPUT SIGNAL
(j) INTEGRATOR OUTPUT SIGNAL
(k) S/H OUTPUT SIGNAL
CASE OF PHASE 180 DEGREES
(l) SIN WAVE SIGNAL (fw/2 SIGNAL)
(m) MULTIPLIER OUTPUT SIGNAL
(n) INTEGRATOR OUTPUT SIGNAL
(o) S/H OUTPUT SIGNAL

FIG.29


REPRODUCTION CIRCUIT
ADDRESS INFORMATION CLOCK SIGNAL
RECORDING MEDIUM
103
RF PROCESSING CIRCUIT
104
WOBBLE INFORMATION DETECTION CIRCUIT
105
SERVO SIGNAL DETECTION CIRCUIT
106
SERVO PROCESS CIRCUIT
102
OPERATION CIRCUIT
101
LASER DRIVE CIRCUIT
90
93
94
92
91
107
100
MOTOR

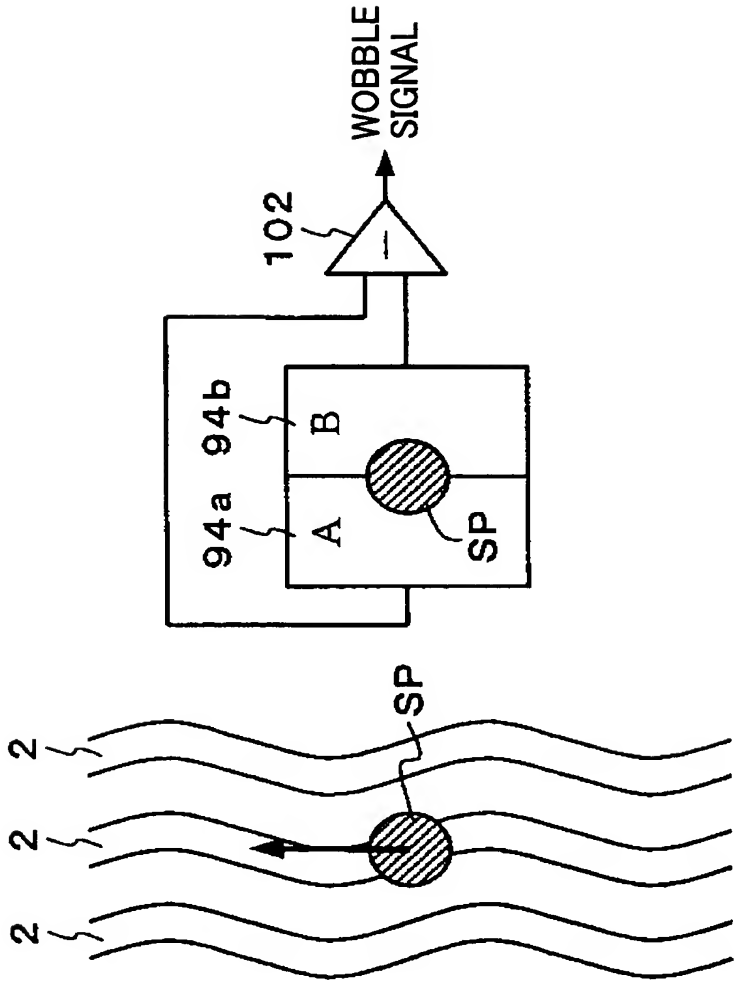
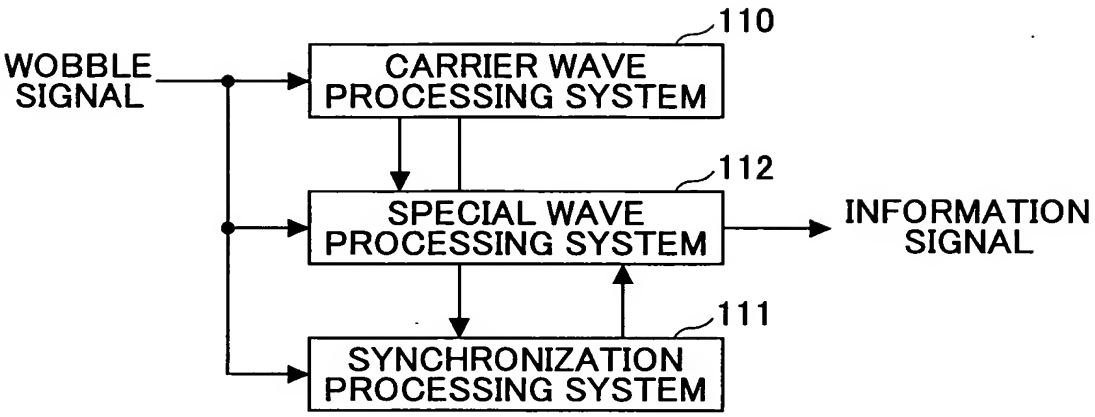


FIG.30B

FIG.30A

FIG.31


110
WOBBLE SIGNAL
CARRIER WAVE PROCESSING SYSTEM
112
SPECIAL WAVE PROCESSING SYSTEM
INFORMATION SIGNAL
111
SYNCHRONIZATION PROCESSING SYSTEM